Colony of Seychelles.

ANNUAL REPORT

ON

AGRICULTURE AND CROWN LANDS

FOR THE

YEAR 1916.

Published by Command of His Excellency the Governor.

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1917.

AGRICULTURE AND CROWN LANDS

ANNUAL REPORT FOR 1916.

CHAPTER I.

EXPENDITURE, RECEIPT, SALE OF PRODUCE &c.

	Rs	c.
Sale of Produce	1,515	38
Royalty on Guano	4,616	90
Export duty on Guano	980	00
Rent of Crown Lands	13,971	29
Total Rs ...	21,083	57

The total expenditure under Agriculture and Crown Lands amounted to Rs 11,374.84.

The principal plants sold were the following :—

Giant Bamboo (Dendrocalamus giganteа).
Hybrid Java and Robusta coffee.
Casuarina equisetifolia.
Palm oil (hard and soft kernel varieties).
Citrus (improved varieties).
Gum copal (Trachylobium verrucosum).
Mangoes (improved varieties) and a great variety of ornamental plants.

Among the plants successfully introduced during the year the following may be mentioned :—

Casimiroa edulis.
Eugenia pitonbo.
Flacourtia Ramontchi var :
Rollinia sieberi.
Carissa grandiflora.
Saraca indica.
Colvillea racemosa.
Dipterix odorata (Tonka bean).
Diospyros Kaki.
Hawaian papaw.
Coffea robusta.
,, Quillou.
,, canephora.
,, Congensis.
,, excelsa.
,, Dybowskii.
,, Java hybrids.

About 59 varieties of Rattan seeds from Java, Singapore and the Malay States have also been received in 1916 but none of these have germinated as yet. Palm seeds take often a long time to germinate. Seeds of palm oil, for example, received from Lagos in 1912 are still germinating at the time of writing (February 1917).

CHAPTER II.

STRIKING SPECIES WHICH FLOWERED OR FRUITED FOR THE FIRST TIME.

1. Sandoricum radiatum (from Java).—This tree grows very quickly at various altitudes up to 600 feet. It will also stand a certain amount of shade and seems quite at home in the jungle. The largest tree (4 years old) at the Botanic Station is about 40 feet high and measure 20 inches girth. It fruited for the first time this year in October but the fruits were shed before maturity.

2. Durian (Durio Zybethimus) (from Malaya).—The largest tree in the garden which is about 50 feet high, grows in rocky ground. It is 12 years old. It flowered regularly for the last three years but the flowers did not set except this year when 6 fruits were counted in December. It is hoped that some of them will reach maturity. They are already of the size of a child's head. I am under the impression that this fruit tree is better adapted to the hills than to the low country, although it may not grow as quickly up country.

3. The "Gros Michel" Banama of Jamaica of which suckers were received from Fiji in 1912, is doing well at the Botanic Station. The bunches reach enormous dimensions and the flavour of the fruits is very similar to that of the dwarf Chinese banana (banane gabou).

4. Papaw from Hawaji seeds were received from Mr Fairchild of the United States Department of Agriculture. The seedlings fruited six months after planting and produced fruits from the very base of the stem, a feature which never happens with the other varieties already introduced.

5. A coarse weed introduced from India in 1912 (Asystasia Coromandeliana) has spread all over the neighbourhood of the Botanic Station within a radius of 2 to 3 miles. It grows under dense shade as well as in the open and it is now the only fodder grass obtainable during the dry season. For this reason it is a precious addition to our fodder plants which are very limited in number. The trailing habit of this variety of Asystasia may prove a little objectionable in vanilleries but in coconut groves it is worth being propagated and used as a green manure in localities where the poor quality of the soil hinders the growth of leguminous plants.

6. Last year I recommended the culture of Palmyrah palms in the waste lands of Seychelles. The results hitherto obtained with another introduced palm (palm oil Flœis Guineensis) warrant its being also cultivated to a large extent, as already recommended in 1912. This palm, which produces several articles of commerce such as palm oil and palm kernels, has found in Seychelles the very soil and climate which it requires. This is no wonder as palms form 75 o/o of the jungle trees on the hills. This year a bunch weighing 48 lbs was obtained from a tree growing in rocky ground at the Botanic Station. The number of fruits on the bunch was as much as 2392 and each fruit was fully developed and perfectly ripe. A bunch of this size yields as much oil as 25 coconuts. This bunch hardly projected from the axils of the subtending leaf and there was no apparent sign of such an enormous crop of fruits for a person standing under the tree. The fruits are so good to eat that all the employees and labourers of the Botanic Station are very fond of them, besides the Ashanti political prisoners who are regular visitors to the garden in search of a new cluster. Plants of the soft shelled variety introduced from Nigeria were set out in January 1915 and in January 1917 not only male flowers but also small bunches of fruits were produced. The other hard shelled variety which produces occasionally the enormous clusters mentioned above is not so precocious although plants 2½ years of age, were seen this year producing fruits. I do not know if such results are obtained in other colonies but in the literature on the subject at least 5 years are mentioned as the period of time required by the plant to come into bearing. It is to be hoped that an enterprising planter will set out a large plantation as soon as possible. Numerous small plots have been planted out on the Crown Lands. In West Africa where this palm is indigenous it is considered quite as productive as the coconut palm, if not more. There is not the least idea in my mind to recommend it as a substitute for the coconut palm in Seychelles. But the latter palm is so much handicapped by diseases that it is surely worth while to grow side by side with it, as an adjunct, another palm nearly allied to it and quite as productive, on soils not already occupied by the former. As all the coprah of this Colony is exported there is little left in the way of oil cake residues (poonac) for poultry feeding. Palm oil would be instrumental in supplying such a by-product as the oil will have to be extracted locally, and it would besides produce a fruit of no small dietetic value for the poorer inhabitants.

7. Among striking ornamental plants mention has to be made of Heeria macrostachis, Melaleuca lencodendron, Galphimia glauca, white Legerstrœmia, Klenhovia hospita which flowered for the first time this year.

CHAPTER III.

DISTRIBUTION OF INFORMATION ON AGRICULTURAL MATTERS.

Early in the year (February) I was directed to visit the Aldabra Group of islands and report on their resources for the benefit of a Company which had applied for a transfer to them of the lease of these dependencies. The trip lasted 4½ months. On the return voyage a visit was also made at Astove Island which was to remain in the hands of the former lessees.

I was much struck by the important guano deposits still existing at Assumption which may be reckoned at 100,000 tons. This guano is very rich in phosphates, averaging 63 o/o. At Astove very important deposits were also found amounting to 60,000 tons but the composition of this guano has not yet been definitely worked out. At Aldabra the deposits are much poorer although they are 10 times more important. The latter island is over 40,000 acres in extent and is of more ancient formation than Assumption and Astove, a lagoon in this case, having been formed inside the atoll after elevation while, at Assumption, there is no lagoon yet and at Astove the lagoon was formed before elevation. The consequence is that Aldabra is now merely a rim of land which is gradually disappearing by erosion from the lagoon side. The guano deposits which exist there are not as rich as at Assumption or Astove not only because it is impossible to imagine a flock of seabirds large enough to accumulate guano on 40,000 acres of land as easily as on a few hundred acres (Assumption and Astove) but also, owing to the fact that the level of the land, especially on the lagoon side, has been reduced by weather erosion practically to sea level at high tide. The numerous pits which once existed have been filled in by metamorphosed coral and their contents washed out into the lagoon. At Assumption the pits are much deeper, the land being higher and the surface water is easily discharged into the sea a few yards away while, at Aldabra, the surface water collects in marshes and pools, several acres in extent, in which the elements of the guano is completely leached out from the deposits. These pools and marshes do not always dry up in the dry season as many fresh water fishes and crustaceans are found in them. The edges of these marshes as well as the other depressions of the ground form, in some parts of Aldabra miniature forests and meadows which are in striking contrast with the scrubby vegetation found elsewhere. Although I left Aldabra towards the middle of the dry season (June) these marshes were still full of water and the vegetation still luxuriant. I cannot imagine a soil which is richer than these remains of the guano deposits containing about 20o/o phosphates in which an extraordinary amount of organic matter derived from terrestial and aquatic plants have accumulated to

the amount of 25o/o. As the rich soil is of coral origin, one can say that in it orchids like vanilla would find an ideal medium for their growth. The miniature forests are formed of spindly trees growing only a few inches apart which could be most conveniently used as props for vanilla. The climate of Aldabra is also drier than that of Mahé, and one knows that permanent rains are not so good as well marked wet and dry seasons for vanilla culture as during the dry period the vines are rested and more easily matured. Under these conditions a better and more regular flowering takes place than in wet places like Mahé when one good crop is obtained only every four or five years. A proof of the suitability of some parts of Aldabra to the culture of vanilla is afforded by the most luxuriant growth and flowering of two orchids (one angraecum and one aerides) which reach enormous dimensions on one islet of the western channels near Picard Island. Seeds of these plants have somehow reached the spot in question : (a miniature islet on the edge of the rim of land) and the climate, soil and surroundings were so beneficial to the plants that they now form clumps of extraordinary luxuriance reminding one of pine apples or aloes grown out of cultivation rather than of the orchids in question which grow singly in Mahé and elsewhere. These soil and weather conditions may also render possible the culture of fruit trees such as the lime which are handicapped by scale insects in other parts of the Archipelago. In spots where coral, lime, humus and phosphates combine to form an excellent soil it is worth while establishing plantations of fruit trees. In these soils papaws and coconuts fruit so abundantly owing to the proper combination of the fertilising elements that the clusters of fruits are quite uncommonly large. I have counted 10 papaws in one cluster of fruits and the female flowers of the coconut palms are so abundant that under each tree the ground is littered with shedded immature nuts.

These and other points have been fully dealt with in a report submitted to His Excellency the Governor and to the Authorities in England and it is hoped that Aldabra will be put under cultivation when funds will permit. These dependencies should then be regularly visited by a vessel with auxiliary power once a month. The islands of Mahé, Praslin and La Digue are already thickly populated and nothing would relieve more the congested localities than emigration to islands like Aldabra where the sea resources give an abundance of food beyond the means of most of the inhabitants of Mahé. The present lessees themselves would find that it would pay in the long run to establish a permanent population. This would go far to obviate the necessity of continually recruiting from Mahé for the working of the guano deposits.

Since my return from Aldabra I have been engaged in laboratory work with hardly any time to visit other localities. I however arranged to spend 5 days visiting estates in all districts of Mahé in connection with the coconut diseases which are increasing to an alarming extent.

At the request of His Honour the Administrator, I also gave a lecture in the Council chamber at Government House on the methods of tapping and curing rubber. The substance of this lecture was printed and distributed to the planters. The evils of rough tapping was particularly insisted upon as nodules are formed on trees which are murderously tapped.

Much time was devoted to the analysis of fermented cane juice (bacca) which owing to the excise duties newly set forth is being adulterated with imported brown sugar and starch sugar from cereals and beans. The law on the subject will have to be recast to avoid serious losses to the fisc.

Among laboratory works undertaken mention can be made of the following analysis :—

58	samples	of guano and other phosphates
15	,,	of bacca
5	,,	of castor oil
1	,,	of drinking water.

Much technical information was also given to planters on subjects such as tobacco curing, essential oils distillation, rubber curing, dyeing with aniline black, etc.

CHAPTER IV.

METEOROLOGICAL OBSERVATIONS.

The subjoined tabulated returns show that the rainfall during 1916 was 30 inches lower than in 1915 when the highest rainfall was ever recorded at the Botanic Station. A shortage of 30 inches for the whole year had no detrimental effect on the vegetation because the distribution was very good. There is nothing to show that there is much difference in the effect of rainfall on the crops when it reaches 99 inches and when it exceeds 130 inches. There was only one period of drought during the year, it occurred in August and September. It was of too short duration to interfere seriously with the growth of the cultivated plants but it was long enough to cause in some localities a set back in the flow of latex from rubber trees and the dying out of vanilla vines in full bloom. The effect on coconut palms was not apparent. A distinction should however be made between rocky land more or less sloping and plateaux or valleys where the effect of the drought was not experienced at all. On the steep hill-sides the drought as usual showed its maximum effect. Had however vanilla been planted on as great a scale as formerly and not been so much deceased by the Calospora fungus that the short drought would have been, as in ancient days, beneficial to the orchid. The vines which died out were those which were suffering from the fungus disease and also those on which more than 50 pods newly pollinated had been left. Such a heavy crop is fatal to vanilla suffering from disease and even to healthy vanilla. The drought which began in August instead of July delayed the flowering of vanilla until September and the period of drought was just of the required duration to induce a heavy flowering which accordingly took place. Unfortunately the vanilla planted in the Colony covers an area about 10 times less than formerly. I am for this reason of opinion that the rainfall under review was just the one which was required during the year.

A period of rest is necessary for coconut palms, vanilla and other plants. That this period of rest took place in 1916 was clearly shown by the exceptional flowering of many fruit trees such as mangoes which yielded in all districts a phenomenal crop. Every planter of this Colony knows that a good mango crop and a good vanilla crop always coincide. With regard to rubber, the trees on exposed rocky hill sides where those which showed a reduction in the yield of latex but it may be said that this set back was experienced only for a month and that in such situations rubber is out of place.

Meteorological Observations

Daily average per mensem	Temperature		Hygrometer		Rainfall		Rainfall from June to June.			
	Maximum	Minimum	Wet Bulb	Dry Bulb	Humidity	Total monthly	No. of rainy dys	Months	1914–15	1915–16	1916–17
January ...	83.1	78.1	77.2	81.5	74	9.31	16	June	3.50	2.42	4.29
February ...	82.4	78.7	76.1	80.9	97	7.17	11	July	1.11	1.40	5.63
March ...	84.5	78.8	77.8	83.	88	6.96	13	August	1.24	3.55	0.50
April ...	85.7	80.1	79.3	84.1	82	9.28	15	September	12.25	22.27	0.50
May ...	84.2	78.5	77.5	82.7	79	8.06	16	October	13.70	10.82	1.13
June ...	82.3	77.8	76.1	81.1	78	4.29	16	November	10.93	10.93	4.40
July ...	80.1	76.2	73.3	78.8	76	5.63	20	December	12.68	7.07	10.18
August ...	79.7	75.5	73.4	78.5	78	0.50	10	January	18.54	9.31	
September ...	80.4	76.2	73.9	79.1	78	0.50	9	February	30.38	7.17	
October ...	80.9	76.4	74.2	79.8	76	1.13	2	March	7.75	6.96	
November ...	81.8	76.0	76.7	81.2	89	4.40	11	April	13.12	9.28	
December ...	82.4	76.5	76.7	81.5	97	10.18	13	May	4.86	8.06	
	82.2	77.4	76.0	81.0	82	87.41	152		130.06	99.29	

CHAPTER V.

EXPERIMENT PLOTS.

The question of experimental manuring of coconuts which had been so often ventilated in the Colony was at last taken in hand. A special vote of Rs 300 per annum was granted in 1916 for that purpose. Many discussions took place, in 1914 and 1915, at meetings of the Agricultural Board and of special Committees as to whether the experiment was to be made on Government land or not. The attitude of many official members was that Government should not waste money in manuring land belonging to private owners. This would have been an argument of some weight if on Government land there were spots suitable for such experiments. But such is not the case. However, I have been directed to take up a piece of land at Long Island, where the soil is worn out and the ground sloping considerably. As the vote is only Rs 300 and includes the wages of a man in charge at the rate of Rs 13 a month the amount invested in these experiments is a mere bagatelle in comparison with the benefit which ought to be derived from them by the Government and the whole community. For this reason I was in favour of the experiments being made on ground more level and homogenous and repeated in various localities by different planters—Government supplying the imported chemical manures only. In that event the interest of the planters would be more safeguarded and the Government would save money in the long run, as, to be conclusive, experiments made in poor sloping and heterogenous ground have to cover a far longer period of time than in well selected spots. In the matter of agricultural experiments the best plan would be to purchase an estate in working order and to carry out the experiments on a large scale, with the money derived from the produce of the estate. The question of research work involves a certain amount of unusual expenditure which in the eyes of the majority of the planters of the Colony is still not justified. This is the method adopted in Trinidad and other Colonies, where Government owns large estates. Otherwise the experiments are made on a rather shy and insufficient scale in order to suit the opinion of influential persons who are not yet convinced of their necessity. One often hears in this Colony that such experiments should be made in a practical way and not on purely scientific lines. I have endeavoured however to show that experiments which are not scientific are not experiments at all. It is a mathematical problem which has to be solved, in taking into account a series of factors, climatic, cultural and commercial for each one of which provision has to be made accurately in order to deduce afterwards the proper meaning of the results obtained. If the cause of any observed difference is to be explained, only one factor must be varied at a time, otherwise no one can disentangle the results and attribute any difference in yield to any one cause. As trees growing in a given plantation present individual variation in their development which is dependent on soils conditions or is a consequence of their distance apart, it is obvious that all plots must be as nearly equal as possible. Otherwise an experimental error must be allowed for and the mean error of this kind has been calculated at Rothamstead to be 10o/o, that is to say, the yield may be either 10o/o above or 10o/o below what it should have been. With these points in view it is proposed to give the fullest details on the experiments started in order to invite efficient criticism.

At Long Island the 13 following plots have been arranged during the year :

No. of plot.	Manure used.
No. 1	No manure or control plot.
„ 2	Green manuring with velvet beans.
„ 3	Green manuring plus guano (800 lbs per acre). [acre.]
„ 4	Green manuring plus guano and potash (ashes 800 lbs per
„ 5	Green manuring, guano, patash and lime (1270 lbs per acre)
„ 6	Fish guano (600 lbs), fresh sea weeds (3 tons per acre).
„ 7	No manure or control plot.
„ 8	Same as 2.
„ 9	Same as 3.
„ 10	Same as 4.
„ 11	Same as 5.
„ 12	Same as 6.
„ 13	No manure or control plot.

Potash has had to be used in the form of coconut husk ashes, owing to the impossibility of importing Sulphate of Potash. The land is, as stated above, sloping and to avoid the manure of one plot being washed down by rain to another plot, the length of the plots (50 feet wide) was made parallel to the slope and not at right angles to it. The number of trees per plot (all of which are about 30 years old) is the following :—

	No. of trees.	Area in plot in sq. feet.	Area occupied by each tree in sq. feet.
Plot No. 1	12	11,100	926
„ 2	17	14,800	870
„ 3	20	14,800	740
„ 4	14	14,800	1,057
„ 5	12	14,800	1,233
„ 6	16	14,800	925
„ 7	11	14,800	1,345
„ 8	17	14,800	870
„ 9	17	13,875	816
„ 10	10	12,950	1,295
„ 11	16	12,025	751
„ 12	21	10,000	476
„ 13	13	8,916	686

The yield of nuts per plot was carefully ascertained during the year in order to take into account the natural yield of each plot. The manures were received late in the year and they were applied in December. Next year's yield will have also to be counted as the natural yield as it is well known that the influence of manures cannot show itself before a period of at least 2 years after their application. This is due to embryo leaves being formed much in advance in the growing shoot, long before they are developed externally and the influence of manures is exercised on the embryo leaves before they are formed and not on those already formed. It is calculated that embryo leaves take 2 years and 9 months to reach maturity, together with the subtended clusters of nuts.

The probable increase or decrease due to manuring is the increase or decrease of the manured plots, to which is added or deducted the decrease or increase shown by the average of the control plots. When the soil is not homogenous, all the control plots will, under natural conditions, show a variable increase or decrease each year and therefore a much longer period is necessary to arrive at a correct average. The term decrease of the crop of a manured plot entails the fact that the cost of the manure and its application is greater than the increased yield obtained. In Seychelles the market value of nuts is the same for large or small nuts; for this reason there is not the same incentive to the careful selection of nuts for planting which there would be if, as in other countries, larger nuts fetched a higher price than small ones.

THE NATURAL YIELD OF PLOTS FOR 1916.

No. of plot.	No. of trees per plot.	Total number of nuts harvested by plucking.	Nuts per tree per annum.
1	12	333	28
2	17	350	30
3	20	507	25
4	14	349	29
5	12	334	28
6	16	339	21
7	11	253	23
8	17	291	17
9	17	218	13
10	10	103	10
11	16	220	14
12	21	176	8
13	13	137	10

A glance at the above table will show what great variation exists in the natural yield of the plots and how difficult it is, for example, to establish a comparison in the yield between plots 1 and 12. Such wide variation in the yield explains in a few words that we shall have to compare terms which are hardly comparable and in order to make them comparable, average results will have to be deduced only after a long series of years. Much quicker results would have been obtained in a better selected spot but Government had no choice, no planter having consented to carry out the experiments on his estate.

CHAPTER VI.

The Coconut Industry.

	Crop for 1916.	Crop for 1915.
Nuts exported in nature	92,959	200,673
„ converted into copra	18,573,844	20,439,356
„ „ „ oil	575,179	674,568
„ „ „ soap	437,983	445,445
„ consumed locally	4,000,000	4,000,000
Total	23,679,935	25,759,942

The above figures do not give a correct idea of the total amount of the crop for 1916. There were only 4 opportunities of exporting copra during the year and the necessity of keeping the copra, for over 6 months in some cases, caused a deterioration of the article and generally a loss of weight which can be reckoned at 5 to 10 o/o. The damaged copra was turned into oil in some cases and the reduction of 10 o/o affects, for this reason, not only the copra production but also the oil and soap industries. It is calculated that the reduction in the crop is represented by 2 million nuts without taking into account the copra which was held over from November 1916 until the time of writing (February 1917). Owing to the war the Messageries Steamers calling at Mahé were requisitioned for the transport of troops. For about 10 months of the year the copra had to be stored until cargo steamers could be chartered from elsewhere. On the other hand better prices (Rs 530 a ton) were obtained on the market and this will partly make up for the deficiency.

Several new plantations set out between 1903—1910 are just coming into bearing but the crop obtained from the small extra number of trees is more than counterbalanced by severe outbreaks of diseases which go far to reduce the crop year by year. The bulk of the new plantations was however set out after 1910 and are not yet in bearing.

It is probable that the cause of the reduction in the crop referred to last year viz., underbearing following overbearing of unmanured trees in 1914, has also shown its influence in 1916. It is well known that coconut palms develop slowly their vegetative organs and that 2 years and 9 months elapse between the time when the embryo leaf is formed in the growing shoot until the time when the cluster of the nuts borne by it comes to maturity. For this reason it is probable that any disturbance in the physiological conditions of coconut palms shows itself, one way or the other, during at least two consecutive years. The crops for 1913 and 1914 were good and considerably in excess of the preceding crops. It is likely that the resulting diminution in the crop for 1915 was partially reported in 1916.

The factor disease was investigated during the year. In November a whole week was devoted to a tour round Mahé. A report was submitted to His Honour the Administrator on the subject and extracts from it are about to be published. It was noticed that the beetle disease was in the Southern districts more virulent than in other districts while the following other diseases were come across everywhere.:—

1. The stem disease caused by melitomma insulare already referred to.
2. The stem bleeding disease caused by the fungus (Thievalopsis).
3. The little leaf disease.
4. The leaf disease caused by the black barnacle scale (Aspidiotus ficus).
5. The leaf and nut disease caused by the white fluffy scale (Chionaspis inday).
6. The leaf disease caused by the cinnamon scale (Lecanium tesselatum).
7. The leaf base disease caused by the white barnacle scales (Aspidiotus lataniae and A. dictyosperma).
8. The yellow leaf disease caused by a new scale (Aspidiotus Ansei).
9. Last, but not least, a physiological disease caused mostly by shade and lack of food in the soil.

No specific symptoms of the bud rot disease was found although brown and black spots are very common on the young inflorescences, leaf bases and swords. We shall have to be on the look out for this disease which has been found occurring in India, East Africa, Ceylon and which is responsible for the annihilation of the coconut industry in Cuba. It is brought about by different organisms. In India by a fungus (Pythium) and in Cuba and West Indies by a bacterium (bacillus coli) which also attacks men and animals. The disease has been successfully inoculated by Johnson from animals to coconut palms. It may be caused by other organisms not yet identified. From a practical (although unscientific) point of view this variation in the causative organism is, I am afraid, a sign of the disease being some sort of ultimate effect of other unchecked diseases combined.

The disease caused by the militomma beetle is the worst of the lot for the present. It kills the trees gradually; trees of 20 years being more affected than the others. When the attack is severe a young tree is killed out in 2 years but when there are only a few grubs of the beetle present the coconut trees resist for years, but being weakened, it becomes the prey of other diseases. The destruction of the melitomma beetle is imperative and as long as this beetle disease will occur in the Colony the treatment of the other diseases will be made in vain. A tree is killed in full bearing at 20 years when it is worth Rs 20. It would cost only 20 cents to save it. A few estates of 100 acres have lost 50o/o of the trees within the last 20 years, i.e., 250 trees per annum worth Rs 5000. The beetle attacks trees which are not well planted. As it is unable to fly a long distance the eggs are deposited near the ground in cracks of the stem generally caused by aerial roots emerging in neglected plantations. It is easy to remove the grubs by excision of the diseased tissues containing them and tarring over or liming heavily the wounds. The insect is not found attacking other plants.

All the scale insects diseases are very virulent just now but the Aspidiotus scales are parasitised by Cephalosporium levanii which is a beneficial fungus doing more work than that which could be done by spraying and otherwise. It is imperative to spread the leaves harbouring the beneficial fungus over all the plantations and to destroy by fire the leaves free from them. The new scale Aspidiotus Ansei attacks the heart leaf before it is expanded in a few localities but it is quickly spreading all over Mahé. From the fact that it attacks vigorous organs such as heart leaves, one can deduce how uncommonly virulent this insect is. After the leaf opens, the leaflets are discoloured all along the rachis (midrib) and presents a characteristic bright yellow colour which shows at a considerable distance. At the present stage of the disease one can only burn the attacked plants on the spot and put under observations the neighbouring palms to prevent any new outbreak.

In destroying leaves by fire on trees still standing great care should be exercised in not flaming young trees which are not woody enough to prevent sap from exuding after treatment. Only old trees (above 40) should be flamed. Trees of all ages when flamed are however more attacked by scale insects than other trees. In many cases I have seen flamed trees harbouring the fluffy scale (Chionaspis inday) or tender leaves which had just expanded while generally speaking only mature leaves are attacked by this insect.

Sickly trees, grown under shade and unmanured, are also predisposed to scale insect attacks. Manured trees harbour much fewer parasites. This is much in evidence at the Botanic Station where, among other plants attacked by scale insects, it has also been found that Pandanus trees growing in moist soil under natural conditions are free from Hemichionaspis aspidistræ scales while the same trees growing at a short distance from the spared trees in rocky banks are handicapped by the same insect to a large extent.

I have to record the presence of a new scale insect on coconut palms in North Mahé (Ischnaspis filiformis). It looks just like a bit of black thread 2 millemetres long thickly covering the leaflets. This insect was also found on Liberian coffee and palm oil leaves during the year. Great care should be exercised in keeping it under control before it is too late.

An attempt was made during the year to work out statistics showing the acreage under coconuts in Seychelles.

The following are the figures which were obtained with no inconsiderable difficulty:—

	Area planted in acres	Nuts harvested per annum.
Mahé	10,926	8,178,222
Other granitic Islands ...	10,273	11,508,400
Coral Islands	2,390	4,401,600
Total	23,589	24,082,222

The yield per acre per annum amounts to:—

Mahé	748
Other granitic Islands	1,120
Coral Islands ...	... 1,831

Counting 80 trees to the acre the crop per trees would be the following, if the trees were all in bearing, viz:—

Mahé	9·3
Other granitic Islands ...	14·0
Coral Islands	22·9

But the above figures should be doubled as, on an average, only 50 o/o of the trees in a given plantation are in bearing; the balance being formed of young trees which are set out in order to supply vacancies at all times. This practice is adopted because trees over 20 years are likely to be killed out at any moment by the melitomma beetle. It reduces by half the yielding capacity of 1 acre of land in Seychelles. This consideration alone warrants the serious necessity of dealing without delay with the beetle disease.

As compared with other Colonies, the yield of nuts per tree is considerably below the average, except on some coral islands where the soil is rich in guano deposits. A crop in Ceylon is considered as being low when it is below 40 nuts per annum; here in Mahé, it has fallen down to 9 nuts on an average. Of course the figures representing the yield of 80 trees are those of which are to be taken into consideration for purposes of comparison as nowhere in the East are young trees interplanted with trees in bearing to replace in time those that are killed out by disease. Diseases should be properly attended to and the plantations should show uniform growth. With regard to the area of uncultivated land in the whole Colony, figures cannot be properly given as yet as many islands are still unsurveyed but the area under coconuts in Mahé viz., 10,926 acres is less than ⅓rd of the whole area of the island, which measures 34000 acres. Other plantations of vanilla, bananas, cassava, sugar cane &c., occupy at the most 2000 acres; leaving a balance of 20000 acres. It is impossible also to give definite figures regarding the area of land suitable for coconuts owing to outcrops of rocks, but according to localities, the portion of unsuitable soil is very variable. I know estates where the whole area is planted out. I estimate the area about 1500 feet elevation as being 5000 acres and the area unsuited to coconuts and other crops below 1500 feet at 5000 acres. This shows that there are about 10000 acres of land in Mahé which remain to be put under cultivation. On the other islands the cultivable area not yet taken in hand is still more important.

CHAPTER VII.

THE VANILLA INDUSTRY.

The vanilla crop exported during 1916 amounted to 20½ tons. This is the best crop for the last 6 years. The flowering season on which will depend the crop for 1917 has also been good; the months of August, September and October having been very dry. A crop of 25 tons is anticipated for 1917. In 1914 the crop was as low as 2½ tons. Much larger crops were formerly obtained in the Colony. Four reasons may be urged to account for the present reduced crops.

A. The drought which prevailed in the Colony from 1904 to 1912 reduced considerably the acreage under vanilla.

B. The better prices obtained for copra also caused an abandonment of large acreages formerly under vanilla. The orchid was formerly interplanted very often with the palms and many plantations of the latter have been cleanweeded or cleared of vanilla.

C. The diseases which remain dormant during periods of drought have become virulent since the advent of the rainy period. This disease is due to a fungus and it was ascertained this year, from the authorities at Kew, that it is the same fungus as the one described by Massee in 1892, as occurring in Seychelles plantations, and no other. (Calospora vanillae).

D. The soil having been repeatedly occupied by vanilla, for at least 50 years, the orchid, like all other plants, does not grow as easily as formerly.

There are very few planters who take up the manuring of their vanilleries and the regeneration of their plantations by sewing seeds of vanilla and growing and propagating the seedlings in special nurseries. These are however measures which have become imperative, because all the vanilla in the Colony is derived from cuttings introduced 50 years ago, without any

attempt having been made to introduce other new plants from Mexico, or to create more disease resistant varieties, by means of cross pollination and selection. It is well known that varieties of plants reproduced only from cuttings have a greater tendency to degenerate and to become the prey to diseases, than strains obtained by selection from seedlings. In this way the creation of new varieties goes far to check the degeneration of old strains and allows the planter to replace the latter, when it is diseased beyond recovery.

The influence of the four factors, which may explain the shortage of crops, is being felt severely all over the Colony and at present the practice is to plant vanilla in localities where the orchid has not as yet been grown as extensively as in Mahé. In this Island the disease is so bad that very promising plantations have been wiped out by it just after a very good flowering. Planters who have witnessed such calamities will undoubtedly withdrew gradually from vanilla planting.

A series of plots has been arranged this year (1916) in order to determine the influence of Bordeaux mixture in checking vanilla disease due to "Calespora vanillae". A series of vanilla beds were divided into two parts: one part was sprayed with Bordeaux mixture, once a week for 12 weeks, up to the end of 1916; and the other part was left as control. Neutral Bordeaux mixture was used. After 12 weeks not a single leaf of vanilla showed signs of having been scorched and the plants continued to make excellent growth. The behaviour of the vines will be followed until the next flowering season, when they are expected to come into bearing, and the necessary deductions will be drawn. The fungus is saprophytic and lives in dead leaves as well. The mulch on the ground is also sprayed and 4 litres of Bordeaux mixture are used per vine, each time.

MANURING EXPERIMENTS.

Part of the experimental plots Nos 1 to 13 had been in hand 2 years on the 20th July 1916, and the following results are recorded, vanilla having flowered and fruited this year on several plots:—

No. of plot.	Treatment.	No. of times treated.	No. of pods obtained during the year.	Observations.
1	No manure.	...	...	...
2	Leguminous mulch.	10	5	only 1 vine flowered out of 7.
3	Ordinary mulch.	10	...	...
4	Lime.	4	...	...
5	Phosphate.	4	...	...
6	Complete fertilizer.	4	...	..
7	Complete soluble fertilizer.	38	39	4 vines flowered out of 7.
8	Potassium sulphate.	38	39	3 „ „
9	„ chloride.	38	16	2 „ „
10	Ammonium nitrate.	38	...	...
11	Sodium nitrate.	38	22	1 „ „
12	Complete fertilizer.	4	32	2 „ „
13	No manure.	...	19	2 „ „

It is premature to make deductions from the above experiments, the vines being a little over 2 years old. Vines generally come into bearing when they are 3 years old, at least. It may however be stated that the two best yields were obtained from complete fertilizers. These fertilizers are obtained from the firm Truffaut & Co., Versailles, and they are cheap and of uniform composition.

The principal difficulty experienced in these experimental plots is the presence of huge shade trees: Parkia and Albizzia which throw out into the vanilla beds numerous rootlets which check the plants. These rootlets have to be dug out continually and show clearly to what extent vanilla is injured by huge trees growing near by. There is no doubt that this factor will have to be taken into account in deducing conclusions from these experimental plots which should, as already recommended, have been set out on the hills, without shade trees. Vanilla does not grow without shade in the low country. Another difficulty is the diseased condition of a few vines which have to be treated with Bordeaux mixtures, as the experiment would be upset if one of two vines were killed out.

The vanilla vines growing under Gliricidia shade have done hitherto well; the plants not being checked by rootlets as in the case of Parkia and Albizzia. The vines of this plot are manured only with the green dressings obtained by lopping the branches of Gliricidia about 4 or 5 times a year. The manure in this case is provided by the prop itself. This plot has been arranged because it is the custom in this Colony to manure vanilla in that way only: save that the props generally used are not leguminous plants like Gliricidia which absorbs nitrogen from the air and improves the soil in which it grows.

CHAPTER VIII.

THE RUBBER INDUSTRY.

The production of rubber during 1916 amounted to 2739 kgs., valued at Rs 6746, or ten times more than last year. The tapping of rubber began spasmodically in 1911. There is still a very small number of trees tapped (4000) although during the year, much more atten-

tion was paid to this industry. Planters who had practically abandoned their plantations for the last 2 years resumed tapping when it was shown that with the present price (1/6 to 3/-), there was no industry in the Colony more profitable than rubber planting. The cost of production on a 10 acres plantation 8 to 9 years old was carefully worked out and the following results were published for general information :—

Cost of cultivation per lb	R 0.00
Cost of tapping and curing	0.45
Cost of depreciation, interest, &c	0.02
Cost of packing and shipping, &c	0.02
Cost of freight, commission, extra war charges, &c....	0.19
Total	0.68

The yield was found to be 2½ lb, per tree and the sale price in London amounted to Rs 1.69 (2/3), leaving a nett profit of R1 per lb, or Rs 2.50 per tree. Counting 150 trees to the acre this plantation produced Rs 375 an acre. Even if the price is reduced to 1/6 and the yield brought down to 2 lbs the nett profit would amount to Rs 225 an acre. A good coconut plantation yields hardly more than Rs 80 an acre and, on an average, the yield is less than Rs 40. When a comparison is made between these two cultivated plants one is inclined to make sweeping statements and to say that coconut is more paying, because it is so in other Colonies. Each country has to be examined on its own merits. The worn out coconut plantations of Seychelles produce on an average only 1020 nuts per acre, they being handicapped by bad cultural methods, by little or no manuring and by a host of insect and fungus pests. I heard this year a visitor of note stating that this Colony was not a rubber country, because he had seen a few plantations which were not doing well, and that while there were splendid trees in a given plantation, others growing side by side were not bigger than a walking stick. In the Malay States the walking sticks are very conspicuous (vide photos in Wright's book on rubber). The same authority however admitted publicly in a lecture, after he was taken over a good plantation near Victoria, that it was possible to make rubber pay well in the Colony when grown under certain conditions. If rubber can pay well as it does when, as on the estate in question it is carefully planted on a well selected piece of ground, one can deduce that the same method of procedure can be adopted all over the Colony. With 5 to 10 acres of rubber, a small factory can be worked because no expensive machinery is required to produce a good article. Labour is cheap and plentiful in the Colony and, in Mahé alone, there are, to my knowledge, over 4 to 5000 acres of waste land where rubber can be grown as well, as on the estate under consideration, if not better. Rubber planting is perhaps the only industry which can be worked economically on a small scale, and which is not exposed to marauders, and for these reasons, it is well adapted to the agricultural conditions prevailing in Seychelles at present. Furthermore the labour and sanitary conditions of the Colony permit of a greater reduction in the cost of production than in the East. Rubber in Seychelles is free from diseases, it grows well when planted in the proper soil and when it is well looked after. I am afraid that if it is said, in spite of the results already obtained, that Seychelles is not a rubber country, than neither is it a coconut or vanilla country because not only are these two latter plants handicapped by all sorts of diseases but they also yield, when compared with the crops obtained in the Far East, a more reduced crop. The composition of the soil both mechanically and chemically and the weather conditions are exactly the same in the Straits, Malay States, Ceylon &c, as in Seychelles. The only difference lies in the size of these various colonies, although there are many islands in the Malay Peninsula not much larger than Seychelles where rubber is grown advantageously. The famous damp alluvial flats where rubber is so productive, only exist along the coast of these countries. Laterite soils of the same composition are quite as abundant there as in Seychelles.

In the lecture already referred to, I pointed out that there is a tendency to overtap trees in Seychelles, by using the half spiral system but it should be remembered that the trees are young and that it is not easy to tap them on the one quarter system by which two channels instead of one are made down the stem. This system will be adopted when the trees are older and big enough to make room for the channels in question. Much stress was also laid in the deep incisions which are too often made on young trees but this can hardly be avoided on new estates until the tappers are trained.

On a few estates it has been decided to thin out young rubber too closely planted but in the majority of cases this system seems to be too leniently adopted and too much delayed. I noticed that on a few estates, on which coconut and rubber were interplanted, that rubber was mercilessly cut down. This procedure should be adopted with care as in many cases the coconut palms are dying from diseases. It is often a question as to which of the two trees should go to the wall. In many cases the coconut trees are so badly attacked by the melitomma beetle that, unless the pest is eradicated, the palms will not reach 20 years. If they are to remain without treatment it is unsound to cut down rubber trees growing in the same grove ; as a long unproductive period will result if one tree is cut down and the other is doomed to die. The planter in this case may be pulling out the wrong tooth from his mouth, if this phrase is applicable.

CHAPTER IX.

ESSENTIAL OILS AND OTHER MINOR INDUSTRIES.

	1915		1916	
	Quantity in litres.	Declared value in Rs.	Quantity in litres.	Declared value in Rs.
Cinnamon bark oil... ...	99	1,099	1,824	15,609
,, leaves oil. ...	9,587	37,572	15,069	67,256
Clove leaves oil	465	2,325	2,137	10,557
Lemon grass oil	77	308	6	24
Bitter orange leaves. ...	...	...	22	88
Vetiver oil	...	...	31	666
Total ...	10,228	41,304	19,089	94,200

The distillation of essential oils is steadily progressing, the quantity of oils exported being double that of last year and two new stills having been erected in 1916. The bulk of the oils exported is manufactured from cinnamon leaves and the industry is found to be very profitable. The demand in England for this oil is firm and a rise in the price was recorded in 1916. The yield varies from 0·6 to 0·8o/o according to the season; the flowering and bearing season (September to March) being the period of low yield. It has been found that the capacity of the still should be about 4000 litres and that it should contain about 1200 kilogs of leaves which yield about 8 kilogs of oil. The article can be sold locally at about Rs 4.50 per kilog. It is exported in bottles and in drums. The residue from the still is used as fuel and as manure. In the worn out soils of Mahé the great quantity of organic matter derived from this residue is very beneficial. A well known coconut estate on the hill-side near Victoria has been transformed by the use of this residue. Coconut trees which hardly produced any nut at all were seen to yield a normal crop a couple of years after the use of this humus forming material. Owing to the difficulty of getting cattle manure in the Colony, the erection of numerous essential oil distilleries will go far to produce a substitute which is worth having. It is well known that the use of chemical fertilizers is much less beneficial when no bulky organic matters are used at the same time as manures. In this connection the development of the essential oils industry will have an important bearing on the welfare of the Colony. As the residues in question as soon as they begin to decompose form good breeding places for the Rhinoceros beetles, the planters who distill essential oils are bound to dig them in the soil as manure. If not they run the risk of infesting their plantations with a swarm of beetles. This obligation is the reason for which a few planters are said to consider this residue as being injurious to coconut trees. This sort of biased argument will not stand the test of experiment as it is well known that cinnamon leaves residue like all other leaf moulds are beneficial even when used for manuring such delicate plants as maiden hair ferns.

Experiments were made during the year at the Botanic Station, at the request of the Director of the Imperial Institute, in connection with the growing of Ajowan seeds, (Carum copticum) and Ocimum viride for the production of thymol. Although these experiments are not concluded it may be worth mentioning that ajowan seeds cannot be grown easily during the rainy season owing to showers which are too heavy for these delicate plants. They will be experimented with during the next dry season. On the other hand Ocimum viride grows luxuriantly and form perennial bushes yielding at least 6 crops of green leaves per annum in good soil, weighing each 3,759 kilogs per acre. A small sample of oil has already been distilled and forwarded as requested to the Imperial Institute. The yield was found to be 0·41o/o.

CITRATE OF LIME.

1,350 kilogs of citrate of lime was manufactured at Silhouette Island and exported during the year. This article is manufactured from small bitter oranges (bigarades) which are becoming more and more scarce in the Colony; the trees in the low country being attacked and killed out by the green and barnacle scale insects. On the hills these insects are kept in check by a beneficial fungus (Cephalosporium lecanii) but no attempt except on one estate at Mount Sebert has ever been made up country to propagate the plant in question. Citrate of lime is however an article so much in demand on the English markets and elsewhere that as much as £100 per ton is paid for it.

COIR.

This article was exported during the year to the amount of 5,795 kilogs together with 8 packages of ropes. With the present high freight charges (125 francs per cubic metre) it is impossible to export low grade fibres (mattress fibre). Bristle fibre only (worth 75 francs per 100 kilogs) is exported. It is also difficult to get machinery from Europe owing to the war. An attempt was made by an enterprising planter to overcome the present difficulty by manufacturing ropes and yarns for the local market and for exportation to the neighbouring colonies. These ropes are sold locally at Rs 60 per 100 kilogs. The yield of fibre in the factory per 1000 husks amounts to kilogs 22.5 bristle fibre and 157.5 spinning and mattress fibre. The small factory at Cascade has been improved this year by the addition of a new crusting ma-

chine capable of working 4,500 husks per diem. Owing to the large proportion of unemployed labourers in the Colony this coir industry among others is one which should occupy more the attention of planters. At present the coconut husks are wasted and accumulate in the plantations to the great prejudice of the palms which suffer at the roots and at the base of the stem from these huge heaps of organic matter of slow decomposition. These husks are sometimes used for the manuring of vanilla owing precisely to their fibrous texture and to the large amount of potash and lime which they contain. When left in the field they soon become covered with a luxuriant growth of bushes and herbaceous plants which bear testimony to their value as manure but which at the same time goes far to choke the young palms and to interfere with the growth of the old ones.

CHAPTER X.

Fisheries.

The exports from the outlying islands amounted to :—

Salt fish	kgs	28,592	valued at Rs 1,883
Calipee	,,	2,538	,, 4,623
Trepang	,,	795	,, 356
Fish oil (Whale) ...	litres	7,000	,, 21,000
Shark fins	kgs	901	,, 648
Tortoise shell ...	,,	875	,, 16,224
Guano	tons	980	,, 29,400

The exportation of guano shows the following reduction from want of freight :—

1913	tons 34,720	valued at Rs 997,400
1914	,, 18,607	,, 558,210
1915	,, 1,960	,, 58,800
1916	,, 980	,, 29,400

The small quantity of guano exported during 1916 went to Mauritius where this article fetched much higher prices than formerly (about Rs 100 a ton). There are several hundreds of thousands of tons of guano left in the Colony and this article will always be in great demand all over the world owing to its composition and high fertilizing value. The percentage of phosphate reaches and even exceeds 60 o/o of which 40 o/o are in the soluble form (Biphosphate). Another company started exporting guano from a hitherto unexploitable island towards the end of the year under review. This guano was found of good composition and free from iron and silicates. The lower grade will be utilized locally, the island in question being only one day's journey from Victoria. The effect of this guano on the coconut plantations of the Colony cannot be overemphasized. When an island is small enough to allow all its soil being soaked with Phosphate solutions originating from the guano beds, the crops of nuts obtained is fabulous. I know several islands of this description where the crop reaches 8000 nuts per acre, while the average crop in Mahé is only 1000 nuts and even lower. A few planters begin to realize the necessity of manuring the soils of Mahé with guano which can be offered for sale at the unique low price of about 7 cents per unit of Phosphate. The usual price per unit all over the world varies between 30 and 50 cents. It is often said and repeated that Government should stop guano exportation for the benefit of the agricultural development of the Colony, from fear of exhaustion of deposits. No such apprehension need be felt. Guano deposits have been accumulated in the past centuries by flocks of birds which have disappeared almost entirely and in many localities guano deteriorates by admixture of vegetable matter and removal of its soluble elements by rain and sea water. The utilisation of this guano has in my opinion already been delayed too much. On most islands the quantity of merchantable guano (about 50 o/o phosphates) is a mere bagatelle in comparison with the total quantity found in pits, crevices and on the surface of the ground. This guano of low grade, which cannot be exported, will be always left for local use. One can reckon that there are millions of tons of this guano obtainable in the whole archipelago.

A small quantity of whale oil prepared during 1914 was exported in 1916. It is a great pity that whale oil manufacture is interrupted for the present in the Colony. The by-product derived from it (fish guano) was just the kind of manure which, after being mixed with guano and seaweed, would produce its maximum effect on coconut plantations. It is hoped that this enterprise will be resumed after the war, as besides whales, there is a great variety of fishes of all sizes on the innumerable submerged coral banks of the Colony, which would go far to keep a fish guano factory running for a long time.

I was much impressed this year by the sea resources of the Aldabra Group where the number of fish and turtles defies description. I have seen peculiar large fishes of the ray and shark families which live in the sand bars of lagoons and elsewhere and their number can be gauged by the fact that the lagoon at Aldabra is larger in area than Mahé. The numerous guano deposits by being leached out into the sea afford abundant food for crustaceans and other organisms which are preyed upon by fish. Some of the fishes are in their turn the prey of frigate birds and gannets which close the cycle in producing fresh quantities of guano. It is difficult to find a more congenial home for many varieties of fish. Time is come for their industrial exploitation, as guano is no longer formed on the same scale as formerly. This implies that with the disappearance of the soluble elements of guano, the organisms on which

the fish feed will in their turn disappear and the sea resources will one day be more depleted than at present. The fate of coral islands like Aldabra and others is their conversion into mere sandcays by erosion from the lagoon side. It would be important to exploit these islands when their natural resources are capable of yielding their maximum.

CHAPTER XI.

INSECT NOTES.

51 species of insects belonging to 29 groups were sent this year to the Imperial Bureau of Entomology and in each case their identification was so promptly made known to me that I had hardly time to lose sight of them and double specimens of most of them were still on my working table when the information as to their indentification was received. The importance of the rapidity with which this sort of information is obtained cannot be too much emphasised for a colony like Seychelles where Entomologycal work must be spasmodical as it has to be carried out by the officer in charge of Agricultural, Botanical, Chemical and Technological work at the same time and without proper installation for each section.

The new coccidæ are the following :—

Aspidiotus aldabricus sp. nov. } both on bois d'amande from Passe Hoarau,
Aspidiotus longispinus. } Aldabra.
Alenrodes sp. on bois dur (Securinga durissima) Passe Hoarau, Aldabra.
Pulviraria pseudo-floccifera sp. nov. on Mapou (Pisonia macrophylla) Picard, Aldabra.
Chionaspis solani sp. nov. on tomato, Astove Island and Sida spinosa, Assumption.
Antoina bambusæ under leaf sheaths of bambou, Aldabra.
Psendococcus virgatus on ficus sp. and cassia mimosoides, Aldabra.
Lecanium hesperidum a dwarf form on Ficus sp. Assumption, on verveine Cosmoledo, on Bambara, Aldabra.

During my investigations at Aldabra I was struck by the prevalence of scale insects, with its commensal the sooty mould, in spots which had never been visited before. To reach these spots, in search of guano deposits, twenty men had to work several days to open up a foot path about a mile long in dense scrub. This is mentioned here in reference to the statements made generally in Seychelles to the effect that the sooty mould is a newly introduced pest from Ceylon. It has probably existed, in Seychelles, for several centuries, if not for hundreds of centuries. It is unfortunate that, the following scale insects have been lately introduced from Mahé into these islands of the Aldabra group :—

Aspidiotus dictyospermi—on coconut inflorescence at Aldabra and leaf stalks at Astove.
Aspidiotus lataniæ—on coconut husk, Aldabra and Astove, on Castique (Phyllanthus, Aldabra).
Chionaspis inday—on leaf stalks and fronds of coconut, Cosmoledo, on husk of coconut, Astove.

These insects are rapidly propagating, especially at Cosmoledo where the leaves and nuts of the majority of the trees are white with chionaspis scales. On these islands, where the plantations are still far apart, it would be better to sacrifice a few crops and to flame the infested trees in order to get rid at once of these insects. At Aldabra, where the coconut plantations are over 25 years, the trees bear heavily but in addition to the harm done by the scale insects they are beginning to be handicapped, by the stem bleeding disease and the little leaf disease.

Among the coleoptera identified this year, I have to record several of them found in coprah and poonac stored for some time. The manufacturers had to store these articles a longer time than usual, owing to the exportation, by Messageries Steamers, having been stopped for over 6 months. Some coprah, more or less spoiled, had to be transformed into oil and the cake residue (poonac) also kept for some time. In the coprah and poonac thus stored in some factories, and also in rotten nuts a considerable number of insects were found to breed.

Among others the following are mentioned :—

Dermestes cadaverinus—in rotten nuts.
Necrobia rufipes—in coprah, poonac.
Silvanus surinamensis—in poonac.
Carpophilus diminutus var contingens—in poonac.
Dipterons and microlepidopterons larvæ.

Necrobia rufipes, locally called lindor, is the insect recorded everywhere as breeding in salt fish, more or less decomposed. It is supposed that it is only found accidentally in coprah stored for a long time in godowns where both articles in question are stored in the same rooms. It is however admitted by scientists that it is an insect which feeds on dipterons and microlepidopterons larvæ and is not injurious by itself. As a matter of fact many dipterous larvæ were found in the coprah incriminated but the larvæ and adults of Nicrobia were in all cases considerably in excess of the dipterons larvæ. It is proposed to carry out investigations in order to determine whether this insect is purely predaceous, as it is supposed to be. It is not considered as a pest for the present and it is not known if it feeds on dipterous larvæ only or also on larvæ of silvanus surinamensis which is to be found everywhere in poonac kept for a little time. This latter insect is certainly injurious to poonac as it bores into it and reduces its feeding value. It is a weevil which can be destroyed by using Carbon bisulphide under a tarpaulin.

CHAPTER XII.

CROWN LANDS.

The following plants were set out during the year :—

At Niol—560 feet high.

Parkia Roxburghii	450	Gum copal (Trachylobium verrucosum)	1902
Tamarind (T. Indica)	36	Gliricidia maculata	461
Calice du Pape (Tecoma leucoxylon)	622	Latanier (Stevensonia grandiflora) ...	215
Cocoplum (Chrysobolanus icaco) ...	536	Sang dragon (Pterocarpusindicus) ...	50
Palm oil (Eleis guineensis)	150	Para rubber (Hevea Brasiliensis) ...	12
Bois de table (Heritieralittoralis) ...	950	Takamaka (Calopphyllum inophyllum)	147
Cedars (Casuarina equiseti folia) ...	90	Styrax Benjoin	2

At Delanos—1500 to 2000 feet.

Various citrus plants	163	Robusta & other allied coffee ..	250
Bois Maret (Uapaca Griffithii) ...	141	Pearch (Persica vulgaris)	33
Bois de fer (Vateria Seychellarum)...	20	Bois de natte (imbricaria Seychellarum)	15
Capucin (Notthea Seychellana) ...	150	Palm oil (Eleis Guinensis)	50

At Perard—1500 feet.

Selected Mangoes	12	Loquat (Eriobotrya japonica) ...	10
Anona Cherimoya	10	Carissa carandas	1
Longan (Nephelium Longanum) ...	5	Sapota nigra...	1
Bollinia sieberi	10	Hybrid Java coffee	8
Star apple (Chryphyllum cainito) ...	1	Canarium amboinense	2

At Morne Blanc—1000 feet.

Gum copal (Trachylobium verrucosum)	24	Selected mangoes	4
Flacourtia Ramontchi var	20	Cocoplum (Chrysobolanus icaco) ...	200
Hybrid Java coffees	4		

At Dugand Crown Land—200 feet.

Coco raisin (Seychelles coconut) ...	17	Carissa carandas	7
Ceylon coconut	12	Prosopis juliflora (fodder seeds) ...	17
Mangoes	21	Selected citrus	14
Gum Copal on boundary lines ...	17		

At Government House—100 feet.

Canarium Luzoniense	7	Queensland nut (Macadamia ternifolia)	1
Hybrid Java coffee	7	Tonka bean (Dipterix odorata) ...	2
Palm oil (soft shelled)	6	Sorindeia Madagascariensis (small mango)	1

A large consignment of seeds of Gum copal was received from a planter of Nossi-Bé, Madagascar. These seeds were kept a long time in transit from want of shipping facilities. They were shelled before being sown and in spite of a long journey about 3000 plants have been raised. I understand from old inhabitants that this tree was formerly very common in Mahé but that it was used as timber all over the Island. There are at present only very few and poor specimens left ; they can be counted on the fingers of the hand. The timber is very good and various things go to show that the tree is a quick grower, even in poor soils, which are so common in Seychelles. It is proposed to take advantage of this hardiness by planting as many as possible on Crown Lands. In the north of Madagascar it reaches enormous dimensions and produces by natural exudation in old age a gum which is sold at high prices about (Rs 2 a kilog), in Europe for the manufacture of copal varnish. The seeds emit by burning a dense smoke which is much used in Madagascar as a repellent against mosquitoes.

The Crown Lands at Praslin are all leased to lessees of whom a list was recorded last year. Pointe Zanguilles has been given up by Mr Dubignon to whom it was rented at Rs 100 per annum, and leased to a neighbouring proprietor, Mr Bessin, for 15 years at Rs 50 p. a. increasing quinquenially to Rs 60 and Rs 70. This Crown Land is a worn out estate abondoned by its former proprietors and forms a promentory opposite Curieuse Island. A few coconut and coco de mer trees, much stunted in growth were set out formerly by Government and the late lessees. The soil is only suitable in patches for these palms, the rest of the land is strewn with huge boulders in the intersectices of which Takamaka trees have grown remarkably well. The new lessees will be given the permission to cut these trees at the rate of only a few at a time, in well selected spots, suitable for planting coconuts. In other spots the land will be left as it is, these Takamaka trees forming a dense vegetation which in the long run will considerably improve the soil. This estate is too dry to allow the culture of vanilla or other plants, except in patches and for a short time.

P. R. DUPONT,
Curator of Botanic Station.

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